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NORTH CENTRAL FOREST EXPERIMENT STATION, FOREST SERVICE—U.S. DEPARTMENT OF AGRICULTURE

Folwell Avenue, St. Paul, Minnesota 55101

ASPEN VOLUME TABLES FOR FURNITURE-TYPE, FLAT, 4/4-INCH DIMENSION

ABSTRACT.--Volume tables are given for yield of clear-one-side, flat, dimension from trees and bolts cut in a natural stand of aspen 37 to 62 years old.

OXFORD: 526.6:176.1 *Populus grandidentata*.
KEY WORDS: bolter saw, bolts, flitches, cut-stock, thinnings.

Presented here are volume tables based on the yields of 4/4-inch-thick clear-one-side (C1S) grade, furniture-type dimension cut from bigtooth aspen (*Populus grandidentata*) that were growing on the Northern Highland State Forest near Woodruff, Wisconsin.[1] The trees were selected to provide a range of tree sizes.

All trees were cut off at a 6-inch top diameter inside bark (d.i.b.). The procedures used for sawing and cut-up were described previously.[2] Twenty-one trees were bucked into 199 short bolts 2 to 6-1/2 feet long which were sawed into 1-1/8-inch-thick flitches on a portable bolter saw. None of the bolts had any faces clear. The flitches were kiln-dried to 8 percent moisture content and skip-dressed to 15/16-inch thickness.

The square-foot area of dimension was measured by diagramming various size cuttings on each flitch. Cuttings 1 inch to 6 inches wide and 12 to 72 inches long were recorded for each flitch. About 87 percent of the volume of cuttings was in the 1.5- to 3.5-inch width class and 82 percent was in the 24- to 48-inch-length class.

The sample of aspen contained four trees with heartrot, each with a d.b.h. of at least 12 inches. Because of this, the values of the dimension recovery factor (DRF) for this sample were smaller for the larger trees than expected for trees having no heartrot.

The tables show the maximum volumes recovered from low-quality material cut with a bolter saw. Losses due to further processing were estimated on a sample of flitches from 11 low grade 8- to 12-inch diameter bolts. The flitches were ripped into 2-1/4-inch-wide strips, and the strips finger-jointed and edge-glued into C1S panels. The trials showed that more wood is lost when ripping to a specific width and then crosscutting out the defects than when cutting random widths and lengths. Yield of 2-1/4-inch-wide strips was about 78 percent of the yield of random cut-up obtained by diagramming the same flitches. Crosscutting the defects from the 2-1/4-inch strips and then finger-jointing the ends reduced the yield further. The yield in panels made from the defect-free, finger-jointed strips was 74 percent of the diagrammed C1S yield. These trials illustrate how the volume tables presented here can provide a starting point in determining yields of products for a potentially higher value use for material from low-quality trees and bolts than for other roundwood products.

[1] *The trees were collected with the cooperation and assistance of the Wisconsin Department of Natural Resources, Northern Highland State Forest, Woodruff, Wisconsin.*

[2] *D. E. Dunmire, E. F. Landt, and R. E. Bodkin. Logging residue is a source of valuable black walnut dimension. For. Prod. J. 22(1): 13-17, illus. 1972.*

Table 1.--*Bolt volumes for clear-one-side (C1S), flat, nominal 4/4-inch dimension aspen*[1]

(In square feet)

Bolt d.i.b. small end (inches)	Bolt length (inches)																Number of bolts
	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	
5	0.82	1.02	1.22	1.44	1.65	1.88	2.10	2.34	2.57	2.81	3.05	3.30	3.55	3.80	4.05	4.31	-
6	1.19	1.48	1.78	2.09	2.41	2.73	3.07	3.40	3.75	4.10	4.45	4.81	5.17	5.54	5.91	6.28	65
7	1.64	2.04	2.45	2.88	3.31	3.76	4.21	4.68	5.15	5.63	6.12	6.61	7.11	7.61	8.12	8.64	44
8	2.15	2.68	3.23	3.79	4.36	4.95	5.55	6.16	6.79	7.42	8.06	8.71	9.36	10.03	10.70	11.38	35
9	2.75	3.42	4.12	4.83	5.57	6.32	7.08	7.86	8.65	9.46	10.28	11.10	11.94	12.79	13.65	14.52	26
10	3.42	4.25	5.12	6.01	6.92	7.85	8.80	9.77	10.76	11.76	12.77	13.80	14.84	15.90	16.97	18.04	13
11	4.16	5.18	6.23	7.31	8.42	9.56	10.72	11.90	13.10	14.32	15.55	16.81	18.07	19.36	20.66	21.97	10
12	4.98	6.20	7.45	8.75	10.08	11.44	12.83	14.24	15.67	17.13	18.61	20.11	21.63	23.17	24.72	26.29	4
13	5.87	7.31	8.79	10.32	11.89	13.50	15.13	16.80	18.49	20.21	21.96	23.73	25.52	27.33	29.16	31.02	2
14	6.84	8.52	10.25	12.03	13.86	15.73	17.63	19.57	21.55	23.55	25.59	27.65	29.74	31.85	33.99	36.15	-
15	7.89	9.82	11.82	13.87	15.98	18.13	20.33	22.57	24.85	27.16	29.51	31.88	34.29	36.73	39.19	41.68	-
Number of bolts	-	9	7	7	16	15	1	90	26	1	5	1	-	17	4	-	199

[1]Regression equation for C1S square feet=$0.000806 \times \text{Diameter}^{2.06487} \times \text{Length}^{1.20061}$ (based on all bolts). Standard error of estimate=1.412 square feet. $R^2=0.92$.

NOTE: Heavy black lines indicate distribution of data.

Table 2.--*Tree volumes for clear-one-side (C1S)*[1]*, flat, nominal 4/4-inch dimension aspen and dimension recovery factors (DRF)*[2]

(C1S volumes in square feet)

D.b.h. (inches)	Item	Tree height to a 6-inch d.i.b. top (feet)											Number of trees
		10	15	20	25	30	35	40	45	50	55	60	
6	C1S	4.41	7.47	10.86	14.51	18.39	22.46	26.71	31.13	35.69	40.40	45.23	-
	DRF	*2.78*	*3.31*	*3.75*	*4.12*	*4.46*	*4.77*	*5.05*	*5.31*	*5.56*	*5.80*	*6.03*	
7	C1S	5.47	9.26	13.45	17.97	22.78	27.82	33.09	38.56	44.21	50.04	56.03	4
	DRF	*2.62*	*3.12*	*3.53*	*3.89*	*4.20*	*4.49*	*4.76*	*5.01*	*5.24*	*5.46*	*5.67*	
8	C1S	6.58	11.15	16.19	21.64	27.42	33.49	39.83	46.42	53.22	60.24	67.44	3
	DRF	*2.48*	*2.86*	*3.35*	*3.69*	*3.99*	*4.27*	*4.52*	*4.75*	*4.97*	*5.18*	*5.38*	
9	C1S	7.75	13.13	19.07	25.48	32.29	39.45	46.91	54.67	62.68	70.94	79.43	3
	DRF	*2.37*	*2.83*	*3.20*	*3.52*	*3.81*	*4.07*	*4.32*	*4.54*	*4.75*	*4.95*	*5.14*	
10	C1S	8.97	15.19	22.08	29.50	37.38	45.66	54.31	63.28	72.56	82.12	91.95	3
	DRF	*2.28*	*2.71*	*3.07*	*3.38*	*3.66*	*3.91*	*4.14*	*4.36*	*4.56*	*4.75*	*4.94*	
11	C1S	10.25	17.35	25.20	33.67	42.67	52.12	61.99	72.24	82.83	93.74	104.96	2
	DRF	*2.20*	*2.62*	*2.96*	*3.26*	*3.53*	*3.77*	*3.99*	*4.20*	*4.40*	*4.58*	*4.76*	
12	C1S	11.56	19.57	28.44	38.00	48.15	58.82	69.96	81.52	93.47	105.79	118.44	2
	DRF	*2.12*	*2.53*	*2.86*	*3.15*	*3.41*	*3.64*	*3.86*	*4.06*	*4.25*	*4.43*	*4.60*	
13	C1S	12.92	21.88	31.78	42.47	53.81	65.74	78.18	91.10	104.46	118.23	132.37	2
	DRF	*2.06*	*2.45*	*2.78*	*3.06*	*3.31*	*3.53*	*3.74*	*3.94*	*4.12*	*4.29*	*4.46*	
14	C1S	14.32	24.25	35.23	47.07	59.64	72.86	86.66	100.98	115.79	131.04	146.72	1
	DRF	*2.00*	*2.38*	*2.70*	*2.97*	*3.21*	*3.43*	*3.64*	*3.83*	*4.00*	*4.17*	*4.33*	
15	C1S	15.76	26.69	38.77	51.80	65.64	80.19	95.37	111.14	127.43	144.22	161.47	1
	DRF	*1.95*	*2.32*	*2.63*	*2.89*	*3.13*	*3.34*	*3.54*	*3.72*	*3.90*	*4.06*	*4.22*	
Number of trees		-	1	2	1	3	2	-	7	5	-	-	21

[1]Regression equation for C1S flat dimension is $0.01843 \times \text{Dbh}^{1.38891} \times \text{Height}^{1.29863}$. Standard error of estimate is 10.13 square feet. $R^2=0.98$.

[2]Dimension recovery factor equals volume of C1S in square feet divided by total cubic feet in tree to a 6-inch d.i.b. top. Prediction equation for cubic feet equals $0.00894 \times \text{Dbh}^{1.77686} \times \text{Height}^{0.86729}$. Standard error of estimate is 0.539 cubic feet. $R^2=0.99$.

NOTE: Heavy black lines indicate distribution of data.

EUGENE F. LANDT
Formerly, Principal Forest Products Technologist
Forestry Sciences Laboratory
Carbondale, Illinois (Laboratory maintained in cooperation with Southern Illinois University).
Now with the Wisconsin Department of Natural Resources.

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